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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/869,578	10/23/2001	Edmund M. Carnahan	22,852	4596

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FINNEGAN, HENDERSON, FARABOW, GARRETT &  
DUNNER LLP  
1300 I STREET, NW  
WASHINGTON, DC 20006

EXAMINER

LEE, RIP A

ART UNIT	PAPER NUMBER
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1713

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DATE MAILED: 01/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/869,578

Applicant(s)

CARNAHAN ET AL.

Examiner

Rip A. Lee

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-- Th MAILING DATE of this communication appears on the cov r sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-20 is/are rejected.
- 7) ☒ Claim(s) 1,7,8,18 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION*****Claim Objections***

1. Claim 1 is objected to because of the following informalities: (i) Substituent R (line 10 and 11) is not defined, (ii) on line 19, change "(C)(i)" to "(C)(1)," and (iii) on line 23, change "catalyst" to "complex."

2. Claim 1 is objected to because of the following informalities: The claim is drawn to formation of an olefin polymerization catalyst containing group 9 and 10 metals. An invention of this sort would be meritorious since this feat, to date, is unprecedented. The Applicants are encouraged to establish the validity of the claim.

3. Claim 7 is objected to because of the following informalities: (i) remove the phrase "preferably zirconium or hafnium," (ii) it is not clear how hydrogen, hydrocarbyl, cyano, and halo groups  $R^3$  have up to 20 non-hydrogen atoms; both hydrogen and hydrocarbyl groups necessarily contain hydrogen atoms; a cyano group contains C and N only, and a halogen group is monoatomic, and (iii)  $R^*$ , E and X have not been "previously defined" in claim 5, from which claim 7 depends.

4. Claim 8 is objected to because of the following informalities: (i) remove the phrase "(that is, a hydrocarbadiyl, siladiyl or germadiyl group);" if this is what is meant by the claim, then it should be indicated in the text rather than as a parenthetical, exemplary sidebar, (ii) it is not clear how hydrogen, hydrocarbyl, cyano, and halo groups  $R^3$  have up to 20 non-hydrogen atoms; both hydrogen and hydrocarbyl groups necessarily contain hydrogen atoms; a cyano

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group contains C and N only, and a halogen group is monoatomic, and (iii) R\*, E and X have not been "previously defined" in claim 8, from which claim 9 depends.

5. Claim 18 is objected to because of the following informalities: The claim recites a step in which the procatalyst or catalyst is heated to a temperature from 0 to 60 °C. This implies that at least one of the previous steps listed in the parent claim was performed at subzero temperatures. However, there is no indication for this specialized step in the claims.

6. Claim 19 is objected to because of the following informalities: (i) Substituent R is not defined, (ii) change "(C)(i)" to "(C)(1)," and (iii) on page 45, line 4, change "catalyst" to "complex," and (iv) an objection to the validity of using catalysts containing group 9 and 10 metals is raised herein since there is no precedent for such a process.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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9. Claims 1-3, 5-9, 15, 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,227,440 to Canich *et al.*

Canich *et al.* discloses methods of preparing olefin polymerization catalysts. As is commonly known in the art, the inventors prescribe a dehydration step in which the support material is heated at 100-1000 °C (col. 12, line 32). The support can be pretreated, as shown in Examples 6 and 9, with MAO or TEAL, both of which are Lewis acidic alkylating agents. The treated support is then dried under vacuum. In the examples, a metal complex and co-catalyst are applied to the treated support followed by drying to recover dried catalyst.

The example does not show addition of metal complex and co-catalyst sequentially, as described in the present claims. However, Canich *et al.* clearly indicates that the transition metal component and the alumoxane can be mixed together before addition to the support (col. 5, lines 5-7), or the alumoxane can be placed on the support material followed by the addition of the transition metal component, or conversely, the transition metal may be applied to the support material followed by the addition of the alumoxane (col. 5, lines 12-16). Thus, in view of the fact that all three steps are laid out clearly in the text, one having ordinary skill in the art would have found it obvious to use sequential addition of components to arrive at the subject matter of present claim 1.

The prior art is also silent with respect to the relationship between solution volume and support pore volume. It is noted that the surface area, average particle size and pore volume (0.5-3.5 cm<sup>3</sup>/g) of silica used in Canich *et al.* is essentially the same as that described in the present invention (col. 12, lines 27-32). Given that the catalyst loadings are similar (see Examples), a reasonable basis exists to believe that the prior art process comprises the claimed

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addition of complex or co-catalyst such that 100 % of the pore volume of support is not exceeded. Since the PTO does not perform experiments, the burden is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

One having skill in the art would find it obvious to arrive at the subject matter of present claims 5-9 because Canich *et al.* clearly teaches the use of compound such as  $\text{Me}_2\text{Si}(\text{Me}_4\text{C}_5)\text{N}-\text{C}_{12}\text{H}_{23}\text{TiCl}_2$  and  $\text{MePhSi}(\text{Me}_4\text{C}_5)(\text{N}-t\text{-Bu})\text{TiCl}_2$  (see examples and claim 1).

In view of the fact the same type of support material is calcined using the same dehydrating process, it is also likely that the support of the prior art also possesses the residual OH content recited in present claim 17. Since the PTO does not perform experiments, the burden is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Canich *et al.* teaches addition of TEAL to the polymerization reactor before addition of other components. Monomer is then charged into the reactor (ethylene, 65 psi) followed by injection of catalyst. Once polymerization was completed, the product is recovered from the reactor (col. 19, lines 53-61). Thus, one having skill in the art would find it obvious to follow the general procedure outlined in the prior art in order to arrive at process claims 19 and 20.

10. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,025,448 to Swindoll *et al.* in view of Canich *et al.*

Swindoll *et al.* teaches a process for making a supported catalyst. The inventors prescribe a step in which the support material is calcined, or thermally treated at 100-1000 °C (col. 24, line 15). The support may be treated with a chemical treating agent such as silanes, alkylating agents, and trialkylaluminum compounds (col. 24, lines 30-33). In the examples, a metal complex and co-catalyst are applied to the treated support followed by drying to recover dried catalyst. After the catalyst is prepared, it is typically combined with a metal complex and an activating co-catalyst (col. 25, lines 12-15). Examples 9-19 show that separate solutions of metal complex and co-catalysts are added to the support. The reference does not state specifically that these are added sequentially *per se*, as required by the present claims.

The skilled artisan may simply turn to Canich *et al.* to realize that there are three permutations for addition of components: (i) transition metal component and co-catalyst can be mixed together before addition to the support, (ii) co-catalyst can be placed on the support followed by the addition of transition metal component, or (iii) transition metal may be applied to the support material followed by the addition of co-catalyst (col. 5, lines 12-16). Thus, in view of the fact that all three steps are laid out clearly in the text, one having ordinary skill in the art would have found it obvious to use sequential addition of components to arrive at the subject matter of present claim 1.

The prior art is silent with respect to the relationship between solution volume and support pore volume. It is noted that the surface area, average particle size and pore volume

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(0.5-3.5 cm<sup>3</sup>/g) of silica used in the prior art is essentially the same as that described in the present invention (col. 24, line 2, Swindoll *et al.*; col. 12, lines 30, Canich *et al.*). Given that the catalyst loadings are similar (see Examples), a reasonable basis exists to believe that the prior art process comprises the claimed addition of complex or co-catalyst such that 100 % of the pore volume of support is not exceeded. Since the PTO does not perform experiments, the burden is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

The skilled artisan would find it obvious to arrive at the steps shown in present claim 4 because Swindoll *et al.* clearly shows addition of metal complex or co-catalyst to stirred silica (*i.e.*, a slurry of silica) followed by drying (col. 28, lines 21-26). The subject matter of claim 16 is also obvious to the skilled artisan because Swindoll *et al.* prescribes the use of 0.1-100 mmole treating agent per gram of support (col. 24, line 35), followed by washing to remove excess treating agent and subsequent drying of treated support (col. 28, lines 11-18).

One having skill in the art would also find it obvious to arrive at the subject matter of present claims 5-9 because Swindoll *et al.* clearly teaches the use of compound such as (C<sub>5</sub>Me<sub>4</sub>SiMe<sub>2</sub>NCMe<sub>3</sub>)TiMe<sub>2</sub> (see examples and claims 1 and 22). It is also obvious to one having ordinary skill in the art to use co-catalysts described in present claims 10-14 because these art all taught in the prior art: *viz.* Swindoll *et al.*; ionic compounds of type [L\*-H]<sup>+</sup><sub>d</sub>[A<sup>d-</sup>] (col. 16, line 67 – col. 18, line 15), ionic tetraborates [L\*-H]<sup>+</sup>[BQ<sub>4</sub>]<sup>-</sup> (col. 17, lines 30-41), cationic oxidizing agents (ox<sup>e+</sup>)<sub>d</sub>(A<sup>d-</sup>)<sub>e</sub> (col. 18, lines 45-60), carbenium ion compounds ©<sup>+</sup>A<sup>-</sup> (col. 18, line 61 – col. 19, line 5), as well as silylium ions R<sub>3</sub>Si(X')<sub>q</sub><sup>+</sup>A<sup>-</sup> (col. 19, lines 6-20).



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In view of the fact the same type of support material is calcined using the same dehydrating process, it is also likely that the support of the prior art also possesses the residual OH content recited in present claim 17. Since the PTO does not perform experiments, the burden is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

The polymerization process outlined in present claim 19 is illustrated adequately in the examples of the prior art. Swindoll *et al.* does not teach addition of additional trialkylaluminum as recited in claim 20, but such a step for scavenging adventitious moisture and impurities is well established in the art. In fact, Canich *et al.* teaches this step (col. 19, lines 53-61). Therefore, such a notion would be obvious to one having skill in the art.

11. Claims 1-13 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/45337 to Peil *et al.*

Peil *et al.* teaches a process for making a supported catalyst. The inventors prescribe a step in which the support is calcined at 30-1000 °C (p. 40, line 9) such that hydroxyl content is less than 0.8 mmole, and preferably less than 0.5 mmole, per gram of support (page 40, lines 14-15). The support may be treated with a chemical treating agent such as alkylating agents, and trialkylaluminum compounds (p. 10-13) and silanes (p. 40, lines 22-29). In the Examples, a solution of metal complex is added to slurried silica followed by addition of a solution of co-catalyst. Afterward, solvent is removed under reduced pressure to give a free flowing powder.

The prior art is silent with respect to the relationship between solution volume and support pore volume. It is noted that the surface area, average particle size and pore volume ( $0.1\text{-}3\text{ cm}^3/\text{g}$ ) of silica used in the prior art is essentially the same as that described in the present invention (p. 39, line 30 – p. 40, line 4). Given that the catalyst loadings are similar (see Examples), a reasonable basis exists to believe that the prior art process comprises the claimed addition of complex or co-catalyst such that 100 % of the pore volume of support is not exceeded. Since the PTO does not perform experiments, the burden is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Peil *et al.* clearly teaches the use of compounds such as  $(\text{C}_5\text{Me}_4\text{SiMe}_2\text{NCMe}_3)\text{Ti}(\eta^4\text{-C}_5\text{H}_8)$  (see examples and p. 24-27) as well as co-catalysts such as ionic compounds of type  $[\text{L}^*\text{-H}]^+[\text{A}^{d-}]$  (p. 29), ionic tetraborates  $[\text{L}^*\text{-H}]^+[\text{BQ}_4]^-$  (p. 30), cationic oxidizing agents  $(\text{ox}^{e+})_d(\text{A}^{d-})_e$  (p. 32), and carbenium ion compounds  $\text{C}^+\text{A}^-$  (p. 32). The skilled artisan would find it obvious to use any of these compounds since they are adequately disclosed in the prior art.

Peil *et al.* also teaches a process of polymerizing olefins using the catalysts described therein. For instance, the catalyst is introduced into a gas phase reactor charged with ethylene at 240 psi. Polymer is recovered upon completion of the polymerization reaction (see Examples). One skilled in the art would find it obvious to perform the same sequence of steps since this is clearly outlined in the reference.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peil *et al.* in view of Swindoll *et al.*

Peil *et al.* does not teach use of silylium compounds as co-catalysts, but Swindoll *et al.* shows that compounds of type  $R_3Si(X')_q^+A^-$  (col. 19, lines 6-20) are well suited as co-catalysts for compounds such as  $(C_5Me_4SiMe_2NCMe_3)Ti(\eta^4-C_5H_8)$ . Thus, one having skill in the art would find it obvious to use silylium cations with the compounds in Peil *et al.*, and one would expect such a combination to work. The combination is obvious because both inventions relate to supported catalysts containing the same type of metallocene complexes.

13. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peil *et al.* in view of Canich *et al.*

Peil *et al.* does not teach addition of additional trialkylaluminum as recited in claim 20, but such a step for scavenging adventitious moisture and impurities is well established in the art. In fact, Canich *et al.* teaches this step (col. 19, lines 53-61). Therefore, such a notion would be obvious to one having skill in the art, and one would expect such an embodiment to work. The combination is obvious because both references relate to supported catalysts containing the same type of metallocene compounds.

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14. The prior art made of record but not relied upon is considered pertinent to the Applicant's disclosure. The following references show the state of the art with respect to supported catalysts.

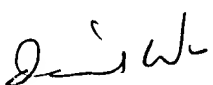
U.S. Patent No. 4,808,561 to Welborn *et al.*  
U.S. Patent No. 4,843,133 to Short *et al.*  
U.S. Patent No. 4,950,631 to Buehler *et al.*  
U.S. Patent No. 5,098,969 to Buehler *et al.*  
U.S. Patent No. 5,654,248 to Kioka *et al.*  
U.S. Patent No. 5,700,749 to Tsutsui *et al.*  
U.S. Patent No. 5,965,677 to Stephan *et al.*  
U.S. Patent No. 6,063,726 to Kioka *et al.*  
U.S. Patent No. 6,197,899 to Mitchell *et al.*  
U.S. Patent No. 6,207,775 to Marti *et al.*  
U.S. Patent No. 6,239,058 to Shamshoum *et al.*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (703)306-0094. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (703)308-2450. The fax phone number for the organization where this application or proceeding is assigned is (703)746-7064. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

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January 16, 2003

  
DAVID W. WU  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700